Customer Energy Savings - for Spring 2009 Newsletter
Kevin L. Jacobs, P.E.

Summer is approaching! Before we find ourselves in the middle of another hot, sweltering southern summer, you may want to take the time and prepare your cooling system for peak loading. We would like to present to you, once again, a few suggestions on saving energy this summer. Energy conservation is beneficial for everyone. Saving energy not only makes economic sense, but is helpful to the environment, as well. Most people think that electricity is a "clean" form of energy and has no environmental impact, but approximately 64% of the electricity produced by TVA is from coal or hydrocarbon-based fuels. Reducing your electrical energy consumption is as important to the environment as reducing your natural gas or gasoline use. We hope the following suggestions are helpful to you as you prepare for the warm days ahead.

Pumps – All of the DES customers have pumps. There chilled water pumps, hot water pumps, domestic water booster pumps and other miscellaneous pumps scattered throughout the system. Almost all of these pumps have seals, bearings and wear rings of some sort. Poor maintenance of these items can lead to premature failure of the pump, which means potential downtime for repairs, or a decrease in efficiency. Excessive vibrations, noise and overheating of the pump can be signs of misalignment, bearings on the brink of failure or wear rings that are worn too much. The most common signs of poor or failed seals is leaking water from around the pump shaft and may be an indication of bearing or alignment problems.

Don't forget the motors, too! Motors have bearings, too, and they need regular inspections and maintenance. Motor bearings should be inspected for damage if you ever have any problems with your pump bearings, seals or wear rings. You should be regularly inspecting your pumps for these types of problems.

Most likely, your pumps run constantly and are major consumers of electricity at your building. Any decrease in pump efficiency can be costly. For example, a pump operating at 2,000 gpm at 70 ft of head with a 77% efficiency rating and a 93% motor efficiency rating draws approximately 48 hp (36 kW). A change in pump efficiency to 72% due to bad bearings or wear rings can lead to an increase in approximately 3.4 hp (2.5 kW). This change in energy may not seem significant at first, but if the pump runs constantly (8,760 hours per year) and electricity cost $0.10 per kWhr, this change in energy equates to approximately $2,200 per year. How many pumps do you have that run constantly? You can see, small changes in pump efficiency can lead to significant savings in energy and cost.

Fan belts - Most fan coil units and air handlers have belt-driven fans. Fan belts become frayed or stretched over time causing slippage between the motor and fan pulleys. This slippage can result in a reduced fan speed, which will reduce the volume of air flowing through the fan. When this begins to occur, you may begin to notice that your air-side temperatures are becoming too hot or too cold, and you may begin to loose control over the air temperature completely. With

damaged or broken fan belts, the motor drives continue to use electricity but will result in less air flow, thus the efficiency of your operation begins to decline. Regularly check your fan belts and replace broken or damaged belts to keep your system working properly! You may also want to inspect for excessive vibrations with the fans and motors or an uneven wearing of the belts, which may be a sign of misalignment. While you're at it, don't forget to inspect the fan and motor bearings! Bad bearings in fans decrease efficiency the same as in pumps. Also, inspect the fan, itself. Excessive build-up of debris or corrosion of the fan can cause the fan to become out of balance creating excessive vibration that will lead to premature bearing or belt failure.

Controls and control valves – Properly functioning control valves and dampers are vitally important in maintaining a healthy and reliable cooling system. You should regularly inspect your control valves at your coils or heat exchangers to make sure they are stroking properly. You may also want to inspect your dampers, especially if you have an economizer cycle on any of your air handlers, to make certain that they are opening and closing when they are supposed to - and only then. Stuck valves and dampers can be a hindrance to your operation but may also be a source of energy loss. Outside air dampers that are stuck open will greatly increase the chilled water required at a coil on a hot day. Similarly, control valves that are stuck open allow chilled water to pass through your coils uncontrollably. These energy losses are difficult to quantify and vary between units, but they can be costly! Your control system (your EMS) can also be a source of energy loss if your thermostat settings are not correct or are not responding properly.

Humidity control and chilled water - It is common for buildings to have humidity control on their coils to maintain a steady level of humidity year-round. You may want to review the operation of your humidity controls to make certain they are not causing an increase in chilled water usage unnecessarily by using too much steam for reheat. We have seen some buildings with both high steam and chilled water usage during the summer months due to faulty humidity control. You may also want to check to see if any changes were made during the heating season on your reheat settings. Some customers may make changes to the humidity controls in winter, but forget to change them back in the spring.

Air filters - Air filters, as we all know, should be checked and replaced regularly. As they become clogged, they introduce restrictions in the air-side flows across your coils. These restrictions may cause an increase in the electrical energy required by your fan. You may also begin to experience a loss of control of the air-side temperatures. In addition with dirty or missing filters, dirt and debris may find their way to the face of your coils. With dirty coils, the air-side flow rate will become restricted, but you may also experience a decrease in heat transfer, thus causing a loss of air-side temperature control and a decrease in delta T. In addition, cleaning your coils can be expensive. Check your air filters regularly and replace them as necessary!

Coils and Strainers – You may have never thought too much about it, but your coils get dirty on the inside, too. Occasionally, debris or sediment may find its way into your coils. This debris can decrease the amount of heat transfer at your coils causing the air-side temperature to

be warmer than it used to be. As the leaving air temperature rises, the leaving chilled water temperature falls, reducing your building's overall delta T. Flushing out the inside of your coils can be costly, but it could greatly improve the space conditioning potential of the coil and help reduce pumping energy by reducing the pressure drop through the coil. While you're at it, you may want to blowdown all of the strainers to ensure that they are clean and not overfilling with debris. If you do clean your coils (inside and out), you may want to make sure that the air-side condensate drain is clean, too. The clean coils may improve your heat transfer so much that you will be able to remove more moisture from the air, thus improving the overall humidity and comfort levels in your building!

Staging equipment – Enough cannot be said about staging your equipment. Although not necessarily a source of energy loss, opening valves quickly or starting many pieces of equipment at once can cause a momentary jump in your chilled water (or steam) demand. These spikes in demand can cause your monthly demand to exceed your contract demand. When this occurs, your demand could be adjusted to a higher value (based on the magnitude of the demand excursion) for the next twelve months! Turning pumps on simultaneously or opening valves quickly have a tendency to cause a sudden jump in chilled water flow through your building. You can potentially avoid a demand adjustment by staging your air handlers, fan coils and pumps over the course of thirty minutes to one hour. In addition, never ever open your main steam valve, or any valve, quickly. Slowly open your valves, either manually or your control valves, to result in a slow cooling of your system over the course of at least one hour, if not longer.